

**Claims**

What is claimed is:

Claim 1. A method of horizontally structured CAD/CAM modeling and manufacturing process for fixtures and tooling, comprising:

selecting a contact area geometry for tooling or fixture modeling; generating a tooling model corresponding to said contact area

5 geometry;

virtual machining said tooling model to generate said fixtures and tooling;

generating machining instructions to create said fixtures and tooling; and

10 said tooling model exhibiting an associative relationship with said contact area geometry.

Claim 2. The method of Claim 1 wherein said contact area geometry corresponds to a dimension of said tool or fixture.

Claim 3. The method of Claim 1 wherein said contact area geometry is two-dimensional.

Claim 4. The method of Claim 1 wherein said associative relationship is a parent/child relationship.

Claim 5. The method of Claim 1 wherein said tooling model is a three dimensional parametric solid model generated by extruding a reference set geometry of said contact area geometry.

Claim 6. The method of Claim 1 wherein said tooling model exhibits an associative relationship with said contract area geometry.

Claim 7. The method of Claim 6 wherein said associative relationship is a parent/child relationship.

Claim 8. The method of Claim 1 wherein said machining instructions comprise process sheets, drawings and documentation defining a part.

Claim 9. The method of Claim 1 wherein said machining instructions exhibit an associative relationship with said tooling model.

Claim 10. The method of Claim 9 wherein said associative relationship is a parent/child relationship.

Claim 11. The method of Claim 1 further including creating extracts.

Claim 12. The method of Claim 11 wherein said extracts comprise replicated models of said tooling model at various operations of said manufacturing.

Claim 13. The method of Claim 12 wherein said extracts are used to generate process sheets.

Claim 14. A horizontally structured CAD/CAM model for fixtures and tooling, comprising:

- a selected contact area geometry for tooling or fixture modeling;
- a tooling model that corresponds to said contact area geometry,
- 5 generated from said selected contact area geometry;
- said tooling model including virtual machining operations to generate said fixtures and tooling; and
- said tooling model exhibiting an associative relationship with said contact area geometry.

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Claim 15. The model of Claim 14 wherein said contact area geometry corresponds to a dimension of said tool or fixture.

Claim 16. The model of Claim 14 wherein said contact area geometry is two-dimensional.

Claim 17. The model of Claim 14 wherein said associative relationship is a parent/child relationship.

Claim 18. The model of Claim 14 wherein said tooling model is a three dimensional parametric solid model generated by extruding a reference set geometry of said contact area geometry.

Claim 19. The model of Claim 14 wherein said tooling model exhibits an associative relationship with said contract area geometry.

Claim 20. The model of Claim 19 wherein said associative relationship is a parent/child relationship.

Claim 21. The model of Claim 14 further including machining instructions generated to create said fixtures and tooling said machining instructions comprise process sheets, drawings and documentation defining a part.

Claim 22. The model of Claim 21 wherein said machining instructions exhibit an associative relationship with said tooling model.

Claim 23. The model of Claim 22 wherein said associative relationship is a parent/child relationship.

Claim 24. The model of Claim 14 further including extracts.

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Claim 25. The model of Claim 24 wherein said extracts comprise replicated models of said tooling model at various virtual machining operations.

Claim 26. The model of Claim 25 wherein said extracts are used to generate process sheets.

Claim 27. A horizontally structured CAD/CAM tooling model for fixtures and tooling, comprising:

- a selected contact area geometry for tooling or fixture modeling;
- said tooling model corresponding to and generated from said contact area geometry;
- said tooling model including virtual machining operations to generate said fixtures and tooling; and
- said tooling model exhibiting an associative relationship with said contact area geometry.

Claim 28. The tooling model of Claim 27 wherein said contact area geometry corresponds to a dimension of said tool or fixture.

Claim 29. The tooling model of Claim 27 wherein said contact area geometry is two-dimensional.

Claim 30. The tooling model of Claim 27 wherein said associative relationship is a parent/child relationship.

Claim 31. The tooling model of Claim 27 wherein said tooling model is a three dimensional parametric solid model generated by extruding a reference set geometry of said contact area geometry.

Claim 32. The tooling model of Claim 27 wherein said tooling model exhibits an associative relationship with said contract area geometry.

Claim 33. The tooling model of Claim 32 wherein said associative relationship is a parent/child relationship.

Claim 34. The tooling model of Claim 27 further including machining instructions generated to create said fixtures and tooling said machining instructions comprise process sheets, drawings and documentation defining a part.

Claim 35. The tooling model of Claim 34 wherein said machining instructions exhibit an associative relationship with said tooling model.

Claim 36. The tooling model of Claim 35 wherein said associative relationship is a parent/child relationship.

Claim 37. The tooling model of Claim 27 further including extracts.

Claim 38. The tooling model of Claim 37 wherein said extracts comprise replicated models of said tooling model at various virtual machining operations.

Claim 39. The tooling model of Claim 38 wherein said extracts are used to generate process sheets.

Claim 40. A storage medium encoded with a machine-readable computer program code for horizontally structured CAD/CAM modeling and manufacturing process for fixtures and tooling, said storage medium including instructions for causing a computer to implement a method comprising:

- selecting a contact area geometry for tooling or fixture modeling;
- generating a tooling model corresponding to said contact area geometry;
- virtual machining said tooling model to generate said fixtures and tooling;
- and tooling;
- generating machining instructions to create said fixtures and tooling; and
- said tooling model exhibiting an associative relationship with said contact area geometry.

**Claim 41.** The storage medium of Claim 40 wherein said contact area geometry corresponds to a dimension of said tool or fixture.

**Claim 42.** The storage medium of Claim 40 wherein said contact area geometry is two-dimensional.

**Claim 43.** The storage medium of Claim 40 wherein said associative relationship is a parent/child relationship.

**Claim 44.** The storage medium of Claim 40 wherein said tooling model is a three dimensional parametric solid model generated by extruding a reference set geometry of said contact area geometry.

**Claim 45.** The storage medium of Claim 40 wherein said tooling model exhibits an associative relationship with said contract area geometry.

Claim 46. The storage medium of Claim 40 wherein said machining instructions comprise process sheets, drawings and documentation defining a part.

Claim 47. The storage medium of Claim 40 wherein said machining instructions exhibit an associative relationship with said tooling model.

Claim 48. The storage medium of Claim 40 further including instructions for causing a computer to implement a method for creating extracts.

Claim 49. The storage medium of Claim 48 wherein said extracts comprise replicated models of said tooling model at various operations of said manufacturing.

Claim 50. A computer data signal for horizontally structured CAD/CAM modeling and manufacturing process for fixtures and tooling, said computer data signal comprising code configured to cause a computer to implement a method comprising:

- 5            selecting a contact area geometry for tooling or fixture modeling; generating a tooling model corresponding to said contact area geometry;
- virtual machining said tooling model to generate said fixtures and tooling;
- 10          generating machining instructions to create said fixtures and tooling; and
- said tooling model exhibiting an associative relationship with said contact area geometry.

Claim 51. The computer data signal of Claim 50 wherein said contact area geometry corresponds to a dimension of said tool or fixture.

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Claim 52. The computer data signal of Claim 50 wherein said contact area geometry is two-dimensional.

Claim 53. The computer data signal of Claim 50 wherein said associative relationship is a parent/child relationship.

Claim 54. The computer data signal of Claim 50 wherein said tooling model is a three dimensional parametric solid model generated by extruding a reference set geometry of said contact area geometry.

Claim 55. The computer data signal of Claim 50 wherein said tooling model exhibits an associative relationship with said contract area geometry.

Claim 56. The computer data signal of Claim 50 wherein said machining instructions comprise process sheets, drawings and documentation defining a part.

Claim 57. The computer data signal of Claim 50 wherein said machining instructions exhibit an associative relationship with said tooling model.

Claim 58. The computer data signal of Claim 50 further including code configured to cause a computer to implement a method for creating extracts.

Claim 59. The computer data signal of Claim 58 wherein said extracts comprise replicated models of said tooling model at various operations of said manufacturing.

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